

### **Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

### **Listing of Claims:**

1. (Currently Amended) A method for determining the distribution volume of a blood component in the body of an organism during an extracorporeal blood treatment, in which the blood to be treated flows in an extracorporeal circuit through the blood chamber of a dialyzer subdivided by a semipermeable membrane into the blood chamber and a dialyzing-fluid chamber, and dialyzing fluid flows in a dialyzing-fluid path through the dialyzing-fluid chamber of the dialyzer, comprising the following method steps:

bringing about a change in the concentration of the a blood component in the blood upstream of the dialyzer by a change in the concentration of the blood component a ~~physical or chemical characteristic~~ in the dialyzing fluid upstream of the dialyzer; and

measuring the change in the concentration of the blood component ~~physical or chemical characteristic~~ in the dialyzing fluid downstream of the dialyzer which can be attributed to the change in the concentration of the blood component in the blood as a result of the change in the concentration of the blood component in the dialyzing fluid upstream of the dialyzer; and

determining the distribution volume V of the blood component from the change in the concentration of the blood component ~~physical or chemical characteristic~~ in the dialyzing fluid upstream and downstream of the dialyzer.

2. (Currently Amended) A method for determining the distribution volume of a blood component in the body of an organism during an extracorporeal blood treatment, in which the blood to be treated flows in an extracorporeal circuit through the blood chamber of a dialyzer subdivided by a semipermeable membrane into the blood chamber and a dialyzing-fluid chamber, and dialyzing fluid flows in a dialyzing-fluid path through the dialyzing-fluid chamber of the dialyzer, comprising the following method steps:

- the concentration of the blood component in a ~~physical or chemical characteristic of the~~ dialyzing fluid is altered in the dialyzing-fluid path upstream of the dialyzer and the concentration of the blood component in ~~physical or chemical characteristic of the~~ dialyzing fluid is measured downstream of the dialyzer;

- the change as a function of time in the concentration of a blood component in the blood upstream of the dialyzer  $\Delta c_{bi}$  as a result of the change in the concentration of the blood component in the dialyzing fluid upstream of the dialyzer is determined from the

~~concentration of the blood component in physical or chemical characteristic of the dialyzing fluid upstream and downstream of the dialyzer after the concentration of the blood component in physical or chemical characteristic of the dialyzing fluid has been altered; and~~

- the distribution volume V of the blood component is determined from the change as a function of time in the concentration of the a blood component in the blood.

3. (Currently Amended) The method as recited in Claim 1, wherein the concentration of the blood component in physical or chemical characteristic of the dialyzing fluid in the dialyzing-fluid path is measured upstream of the dialyzer.

4. (Canceled)

5. (Currently Amended) The method as recited in Claim 1 4, wherein the conductivity of the dialyzing fluid is measured as the concentration of the blood component ~~physical or chemical characteristic~~ for determining the distribution volume of sodium in the blood.

6. (Original) The method as recited in Claim 5, wherein the sodium distribution volume is ascertained for determining the distribution volume of urea in the blood, and the urea distribution volume is determined from the sodium distribution volume.

7. (Original) The method as recited in Claim 6, wherein the urea distribution volume is determined under the assumption that the sodium distribution volume essentially corresponds to the urea distribution volume.

8. (Previously Presented) A method for determining the distribution volume of a blood component in the body of an organism during an extracorporeal blood treatment, in which the blood to be treated flows in an extracorporeal circuit through the blood chamber of a dialyzer subdivided by a semipermeable membrane into the blood chamber and a dialyzing-fluid chamber, and dialyzing fluid flows in a dialyzing-fluid path through the dialyzing-fluid chamber of the dialyzer, comprising the following method steps:

bringing about a change in the concentration of a blood component in the blood upstream of the dialyzer by a change in a physical or chemical characteristic in the dialyzing fluid upstream of the dialyzer; and

measuring the change in the physical or chemical characteristic in the dialyzing fluid downstream of the dialyzer which can be attributed to the change in the concentration of the blood component in the blood; and

determining the distribution volume  $V$  of the blood component from the change in the physical or chemical characteristic in the dialyzing fluid upstream and downstream of the dialyzer,

wherein the physical or chemical characteristic of the dialyzing fluid in the dialyzing-fluid path is increased at a point of time  $t_0$  from a predetermined first value  $cdi_0$  to a predetermined second value  $cdi_1$ , is reduced at a point of time  $t_1 > t_0$  to a predetermined third value  $cdi_2$ , and is increased at a point of time  $t_2 > t_1$  to a predetermined fourth value  $cdi_0$  which is equal to the first value, the value by which the characteristic is increased being half as large as the value by which the characteristic is reduced.

9. (Original) The method as recited in Claim 8, wherein the time interval  $t_1 - t_0$  is equal to the time interval  $t_2 - t_1$ .

10. (Previously Presented) The method as recited in Claim 8, wherein the change as a function of time in the concentration of a blood component in the blood upstream of the dialyzer  $\Delta c_{bi}$  is ascertained from:

the predetermined first value  $cdi_0$  of the physical or chemical characteristic of the dialyzing fluid upstream of the dialyzer and the value  $c_{do_0}$  of the characteristic that ensues downstream of the dialyzer, and the predetermined second value  $cdi_1$  of the characteristic upstream of the dialyzer and the value  $c_{do_1}$  of the characteristic which ensues downstream of the dialyzer after the increase in the characteristic upstream of the dialyzer to the predetermined second value, and the predetermined third value  $cdi_2$  of the characteristic upstream of the dialyzer and the value  $c_{do_2}$  of the characteristic which ensues downstream of the dialyzer after the decrease in the characteristic upstream of the dialyzer to the predetermined third value.

11. (Original) The method as recited in Claim 10, wherein the dialyzing fluid is balanced such that the volume of the dialyzing fluid flowing into the dialyzer during the measurement is equal to the volume of the dialyzing fluid flowing out of the dialyzer.

12. (Currently Amended) An apparatus for determining the distribution volume of a blood component in the body of an organism during an extracorporeal blood treatment in conjunction with an extracorporeal blood-treatment device, in which the blood to be treated flows in an extracorporeal circuit through the blood chamber of a dialyzer subdivided by a semipermeable membrane into the blood chamber and a dialyzing-fluid chamber, and dialyzing fluid flows in a dialyzing-fluid path through the dialyzing-fluid chamber of the dialyzer, having

a device for altering the concentration of the blood component in the physical or chemical characteristic of the dialyzing fluid in the dialyzing-fluid path upstream of the dialyzer, and

a measuring device for determining the concentration of the blood component in physical or chemical characteristic of the dialyzing fluid in the dialyzing-fluid path downstream of the dialyzer,

characterized by an arithmetic and evaluation unit which is designed in such a way that the distribution volume V of the blood component can be determined from a change in the concentration of the blood component physical or chemical characteristic in the dialyzing fluid downstream of the dialyzer which can be attributed to the change in the concentration of the a blood component in the blood as a result because of the a change in the concentration of the blood component physical or chemical characteristic in the dialyzing fluid upstream of the dialyzer.

13. (Currently Amended) An apparatus for determining the distribution volume of a blood component in the body of an organism during an extracorporeal blood treatment in conjunction with an extracorporeal blood-treatment device, in which the blood to be treated flows in an extracorporeal circuit through the blood chamber of a dialyzer subdivided by a semipermeable membrane into the blood chamber and a dialyzing-fluid chamber, and dialyzing fluid flows in a dialyzing-fluid path through the dialyzing-fluid chamber of the dialyzer, having

a device for altering the concentration of the blood component in a physical or chemical characteristic of the dialyzing fluid in the dialyzing-fluid path upstream of the dialyzer, and

a measuring device for determining the concentration of the blood component in physical or chemical characteristic of the dialyzing fluid in the dialyzing-fluid path downstream of the dialyzer,

characterized by an arithmetic and evaluation unit which is designed in such a way that the change as a function of time in the concentration of the blood component  $\Delta c_{bi}$  in the blood upstream of the dialyzer as a result of the change in the concentration of the blood component in the dialyzing fluid upstream of the dialyzer can be determined from the concentration of the blood component in physical or chemical characteristic of the dialyzing fluid upstream and downstream of the dialyzer after the concentration of the blood component in physical or chemical characteristic of the dialyzing fluid has been altered, and the distribution volume V

of the blood component can be determined from the change as a function of time in the concentration of the blood component upstream of the dialyzer.

14. (Currently Amended) The apparatus as recited in Claim 12, wherein a measuring device is provided for detecting the concentration of the blood component in physical or chemical characteristic of the dialyzing fluid in the dialyzing-fluid path upstream of the dialyzer.

15. (Canceled)

16. (Canceled).

17. (Currently Amended) The apparatus as recited in Claim ~~14~~ 16, wherein the ~~first and second~~ measuring devices for detecting the concentration of the blood component physical or chemical characteristic have a conductivity sensor, optical sensor or enzyme sensor arranged in the dialyzing-fluid path downstream and upstream, respectively, of the dialyzer.

18. (Currently Amended) The apparatus as recited in claim 12, wherein the device for altering the concentration of the blood component physical or chemical characteristic is designed in such a way that the concentration of the blood component characteristic is increased at a point of time  $t_0$  from a predetermined first value  $cdi_0$  to a predetermined second value  $cdi_1$ , is reduced at a point of time  $t_1 > t_0$  to a predetermined third value  $cdi_2$ , and is increased at a point of time  $t_2 > t_1$  to a predetermined fourth value  $cdi_0$  which is equal to the first value, the value by which the concentration of the blood component characteristic is increased being half as large as the value by which the concentration of the blood component characteristic is reduced.

19. (Original) The apparatus as recited in Claim 18, wherein the time interval  $t_1 - t_0$  is equal to the time interval  $t_2 - t_1$ .

20. (Currently Amended) The apparatus as recited in Claim 18, wherein the arithmetic and evaluation unit is designed in such a way that the predetermined first, second and third values  $cdi_0$ ,  $cdi_1$ ,  $cdi_2$  of the concentration of the blood component in physical or chemical characteristic of the dialyzing fluid upstream of the dialyzer and the values  $cdo_0$ ,  $cdo_1$ ,  $cdo_2$  of the concentration of the blood component in physical or chemical characteristic of the dialyzing fluid ensuing downstream of the dialyzer are evaluable for determining the change as a function of time in the concentration of the blood component  $\Delta cbi$ .

21. (Previously Presented) The apparatus as recited in claim 12, wherein a balancing device is provided with which the dialyzing fluid can be balanced in such a way that the volume of the dialyzing fluid flowing into the dialyzer during the measurement is equal to the volume of the dialyzing fluid flowing out of the dialyzer.

22. (Currently Amended) The method as recited in claim 2, wherein the concentration of the blood component in physical or chemical characteristic of the dialyzing fluid in the dialyzing-fluid path is measured upstream of the dialyzer.

23. (Canceled).

24. (Previously Presented) A method for determining the distribution volume of a blood component in the body of an organism during an extracorporeal blood treatment, in which the blood to be treated flows in an extracorporeal circuit through the blood chamber of a dialyzer subdivided by a semipermeable membrane into the blood chamber and a dialyzing-fluid chamber, and dialyzing fluid flows in a dialyzing-fluid path through the dialyzing-fluid chamber of the dialyzer, comprising the following method steps:

- a physical or chemical characteristic of the dialyzing fluid is altered in the dialyzing-fluid path upstream of the dialyzer, and the physical or chemical characteristic of the dialyzing fluid is measured downstream of the dialyzer;

- the change as a function of time in the concentration of a blood component in the blood upstream of the dialyzer  $\Delta c_{bi}$  is determined from the physical or chemical characteristic of the dialyzing fluid upstream and downstream of the dialyzer; and

- the distribution volume  $V$  of the blood component is determined from the change as a function of time in the concentration of a blood component in the blood, wherein the physical or chemical characteristic of the dialyzing fluid in the dialyzing-fluid path is increased at a point of time  $t_0$  from a predetermined first value  $cdi_0$  to a predetermined second value  $cdi_1$ , is reduced at a point of time  $t_1 > t_0$  to a predetermined third value  $cdi_2$ , and is increased at a point of time  $t_2 > t_1$  to a predetermined fourth value  $cdi_0$  which is equal to the first value, the value by which the characteristic is increased being half as large as the value by which the characteristic is reduced.

25. (Previously Presented) The method as recited in claim 24, wherein the change as a function of time in the concentration of a blood component in the blood upstream of the dialyzer  $\Delta c_{bi}$  is ascertained from:

the predetermined first value  $cdi_0$  of the physical or chemical characteristic of the dialyzing fluid upstream of the dialyzer and the value  $cdo_0$  of the characteristic that ensues downstream of the dialyzer, and the predetermined second value  $cdi_1$  of the characteristic upstream of the dialyzer and the value  $cdo_1$  of the characteristic which ensues downstream of the dialyzer after the increase in the characteristic upstream of the dialyzer to the predetermined second value, and the predetermined third value  $cdi_2$  of the characteristic upstream of the dialyzer and the value  $cdo_2$  of the characteristic which ensues downstream of the dialyzer after the decrease in the characteristic upstream of the dialyzer to the predetermined third value.

26. (Currently Amended) The apparatus as recited in claim 13, wherein a measuring device is provided for detecting the concentration of the blood component in ~~physical or chemical characteristic of~~ the dialyzing fluid in the dialyzing-fluid path upstream of the dialyzer.

27. (Canceled).

28. (Canceled).

29. (Currently Amended) The apparatus as recited in claim 13, wherein the device for altering the concentration of the blood component ~~physical or chemical characteristic~~ is designed in such a way that the concentration of the blood component ~~characteristic~~ is increased at a point of time  $t_0$  from a predetermined first value  $cdi_0$  to a predetermined second value  $cdi_1$ , is reduced at a point of time  $t_1 > t_0$  to a predetermined third value  $cdi_2$ , and is increased at a point of time  $t_2 > t_1$  to a predetermined fourth value  $cdi_0$  which is equal to the first value, the value by which the concentration of the blood component ~~characteristic~~ is increased being half as large as the value by which the concentration of the blood component ~~characteristic~~ is reduced.

30. (Currently Amended) The apparatus as recited in claim 13, wherein the arithmetic and evaluation unit is designed in such a way that the predetermined first, second and third values  $cdi_0$ ,  $cdi_1$ ,  $cdi_2$  of the concentration of the blood component in ~~physical or chemical characteristic of~~ the dialyzing fluid upstream of the dialyzer and the values  $cdo_0$ ,  $cdo_1$ ,  $cdo_2$  of the concentration of the blood component in ~~physical or chemical characteristic of~~ the dialyzing fluid ensuing downstream of the dialyzer are evaluable for determining the change as a function of time in the concentration of the blood component  $\Delta cbi$ .

31. (Previously Presented) The apparatus as recited in claim 13, wherein a balancing device is provided with which the dialyzing fluid can be balanced in such a way that the

volume of the dialyzing fluid flowing into the dialyzer during the measurement is equal to the volume of the dialyzing fluid flowing out of the dialyzer.